xtramus

DApps-SG User's Manual

USM: V2.0





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Date	USM Version	History	
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1. Change copyright foreword on page 1.			
		2. Change Revision History format on page 2.	
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2020/09/21	1.5	Add NuDOG-802	
2020/06/30	2.0	For DApps-SG C# version	



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Test Instruments and Networks

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1. General Description of DApps-SG

DApps-SG provides a powerful and sophisticated virtual front control panel to manage the NuDOG series. Two test ports can be independently configured with parameters to define multiple streams, filters, and capture capabilities. Traffic for various network protocols can be customized, transmitted, and received on each port. Comprehensive statistics provide users an in-depth analysis of the performance of the DUT (Device Under Test).

DApps-SG is designed for Xtramus Technologies NuDOG series handheld Ethernet testing devices listed in the table down below:

Devices Supporting DApps-SG			
NuDOG-101T	NuDOG-301C	NuDOG-801/802	

Also, please make sure that your PC meets the requirements listed in the table down below before installing DApps-SG.

OS	Windows 7/8/10	
CPU	Pentium 1.6GHz or higher	
RAM	4GB RAM	
HDD	10 GB Available Space	

* Note: Large amount of data will be generated while running DApps-SG. It is recommended to preserve enough available Hard-Disk space to store these data.

Please see the sections down below for detailed information regarding to **NuDOG-101T**, **NuDOG-301C** and **NuDOG-801/802**.



2. NuDOG-101T Descriptions

2.1. NuDOG-101T OVERVIEW

NuDOG-101T is a handheld device with two ports for Ethernet testing. The main functions of NuDOG-101T include multi-streams generation, TAP/Loopback test, and NIC emulation.

Connecting NuDOG-101T to its mini-USB port makes it possible for system configurations and managements. NuDOG-101T is an ideal device for in-field testing.

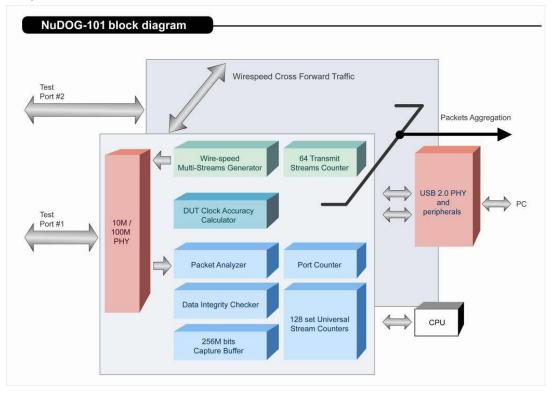
NuDOG-101T can work along with a series of utility software that qualify industrial standards such as RFC 2544 and RFC 2889. With these utilities, NuDOG-101T is able to conduct throughput test, latency test, error filtering test, forwarding test, and so on. The utility software



provides a user-friendly interface for making different test configurations and setting test parameters and criteria. More optional software is available for extended test requirements.

With its unique Universal Stream Counter (USC), NuDOG-101T offers real-time statistics of network events during packet monitoring and capturing.

With these advantageous features, NuDOG-101T is your best partner for LAB researching and in-field troubleshooting.

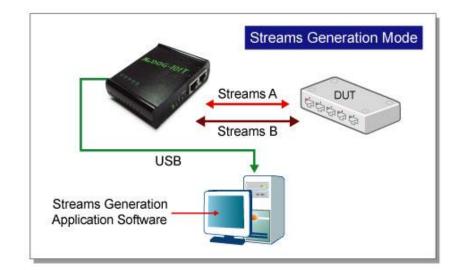




2.2. Features & Advantages of NuDOG-101T

- > Hardware based wirespeed streams generation, analysis, network TAP and NIC
- > High precision performance for measuring throughput, latency, packet loss and disordered sequence
- > Wirespeed traffic capturing with programmable filter and trigger criteria
- Supports Universal Stream Counter (USC) with 128 streams
- RFC 2544 test suite
- RFC 2889 test suite
- Layer 1 and Layer 2 loopback test
- High precision 1 ppm temperature-compensated oscillator provides accurate clock speed to ensure the reliability of the tests
- > Injecting errors in transmitted traffic to simulate and test abnormal situations
- Real-time statistics for each port, including transmitted /received frame for VLAN, IPv4, IPv4 fragment, IPv4 extension, ICMP, ARP, total bytes/packets, CRC, IPCS error and over-and-under size frames
- User-friendly interface that supports various parameter configurations and meets various test requirements
- > 256Mbits packet capture buffer per port

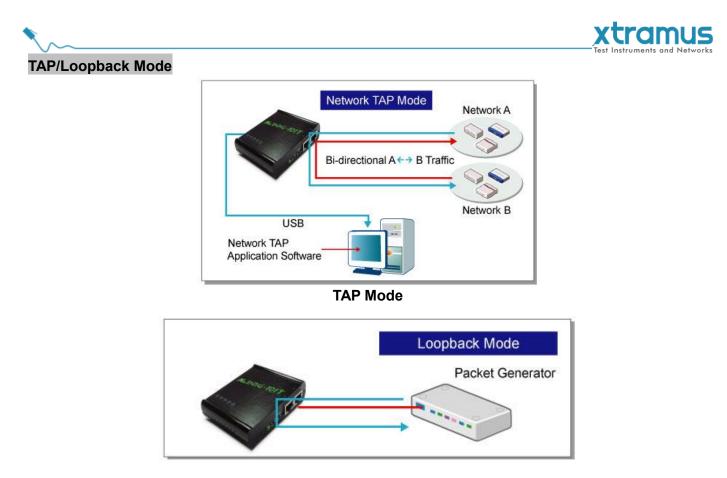
2.3. NuDOG-101T Applications in Different Modes



Stream Generation Mode

In Streams Generation mode, NuDOG-101T generates bi-directional network streams for test requirements as the illustration above.

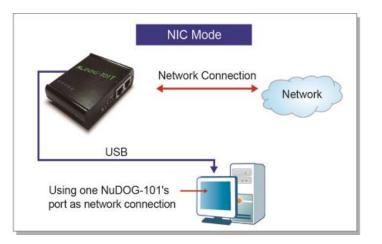
Both NuDOG-101T's Port A and Port B can generate and receive test streams. The test streams are sent and returned to the same NuDOG-101T for DUT (device under test) analysis.



Loopback Mode

In TAP mode, NuDOG-101T can monitor any data that flows through it. Network TAP is a method of monitoring network's situation dynamically without interference. NuDOG-101T can tap bi-directional or uni-directional traffic from different sides (port A and port B) and also provides abundant packet counters. In Loopback mode, NuDOG-101T resends the incoming streams back to the source.

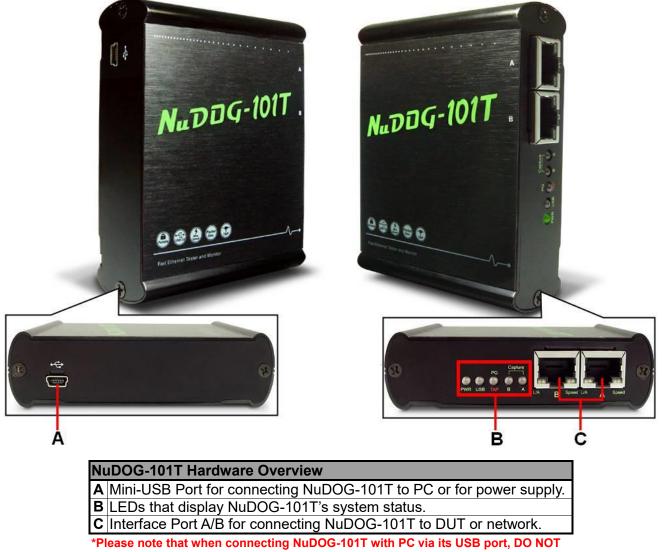
NIC Mode



In this mode, NuDOG-101T simulates network interface card (NIC).



2.4. NuDOG-101T Interface Ports



use a USB hub.



2.5. NuDOG-101T LED Status



LED	Status	Description	
Power	Green Blinking	Power is ON and working properly	
Fower	Yellow Blinking	System failed	
USB	Green Blinking	USB of this device is linked to PC	
	Green	NuDOG-101T is working under Packet Generation Mode	
PG/TAP		NuDOG-101T is working under TAP Mode	
	OFF	NuDOG-101T is working under NIC (Network Interface Card) mode	
Capture A/B	Green	Port A/B is under Capturing Mode	
Link/ACT Green ON The RJ45 Port is		The RJ45 Port is connected to DUT/Network	
	Green Blinking	NuDOG-101T is transmitting or receiving data	
Speed	Green ON	100Mbps connection	
	OFF	10Mbps connection if Link/ACT is ON or blinking	



3. NuDOG-301C Descriptions

3.1. NuDOG-301C Overview

NuDOG-301C is a handheld device with two Gigabit ports for Ethernet testing. The main functions of NuDOG-301C include multi-streams generation, TAP/Loopback test, and NIC emulation.

Connecting NuDOG-301C to its mini-USB port makes it possible for system configurations and managements. NuDOG-301C is an ideal device for in-field testing.

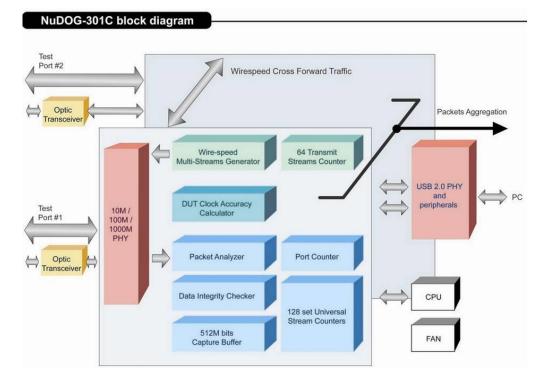


NuDOG-301C can work along with a series of utility software

that qualify industrial standards such as RFC 2544 and RFC 2889. With these utilities, NuDOG-301C is able to conduct throughput test, latency test, error filtering test, forwarding test, and so on. Utility software can provide a user-friendly interface for different test configurations when setting test parameters and criteria. More optional software is available for extended test requirements.

With its unique Universal Stream Counter (USC), NuDOG-301C offers real-time statistics of network events during packet monitoring and capturing.

With these advantageous features, NuDOG-301C is your best partner for LAB researching and in-field troubleshooting.



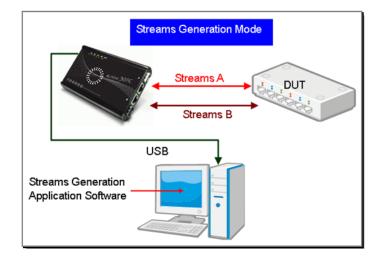


3.2. Features & Advantages of NuDOG-301C

- > Hardware based wirespeed streams generation, analysis, network TAP and NIC
- > High precision performance for measuring throughput, latency, packet loss and disordered sequence
- > Wirespeed traffic capturing with programmable filter and trigger criteria
- > Supports Universal Stream Counter (USC) with 128 streams
- RFC 2544 test suite
- RFC 2889 test suite
- Layer 1 and Layer 2 loopback test
- High precision 1 ppm temperature-compensated oscillator provides accurate clock speed to ensure the reliability of the tests
- > Adding errors in transmitted traffic to simulate and test abnormal situations
- Real-time statistics for each port, including transmitted/received frame for VLAN, IPv4, IPv4 fragment, IPv4 extension, ICMP, ARP, total bytes/packets, CRC, IPCS error and over-and-under size frames
- Utility software with user-friendly interface that supports various parameter configurations and meets various test requirements
- > 512Mbits wirespeed packet capture buffer per port

3.3. NuDOG-301C Applications in Different Modes

Stream Generation Mode

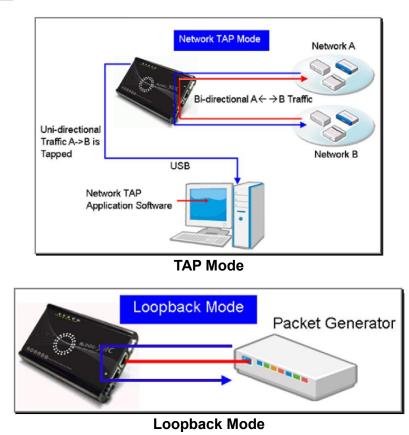


In Streams Generation mode, NuDOG-301C generates bi-directional network streams for test requirements as the illustration above.

Both NuDOG-301C's Port A and Port B can generate and receive test streams. The test streams are sent and returned to the same NuDOG-301C for DUT (device under test) analysis.

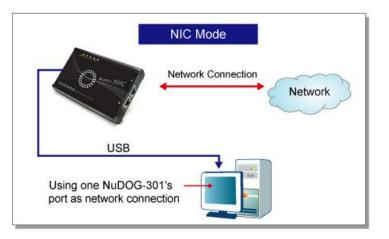


TAP/Loopback Mode



In TAP mode, NuDOG-301C can monitor any data that flows through it. Network TAP is a method of monitoring network's situation dynamically without interference. NuDOG-301C can tap bi-directional or uni-directional traffic from different sides (port A and port B) and also provides abundant packet counters. In Loopback mode, NuDOG-301C resends the incoming streams back to the source.

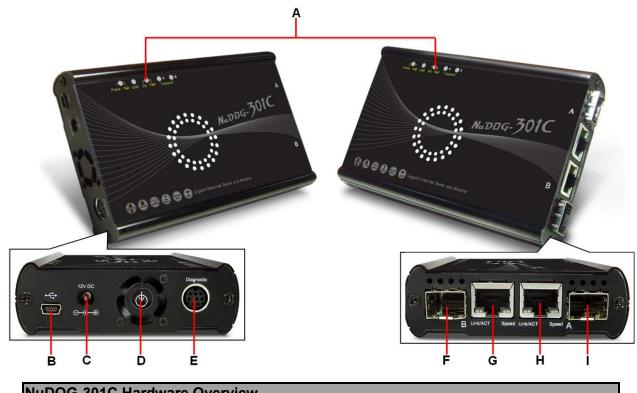
NIC Mode



In this mode, NuDOG-301C simulates network interface card (NIC).



3.4. NuDOG-301C Interface Ports



NuDOG-301C Hardware Overview				
Α	LEDs	LEDs that displays NuDOG-301C's status.		
в	 B Mini-USB Port* 5 Pin Mini-B Receptacle USB Port. You can manage, configure, cupdate firmware/FPGA when connecting NuDOG-301C to your P While under TAP mode, this mini-USB port can also re-direct tapped packets to PC. 		NuDOG-301C to your PC.	
С	C Power Jack 12V DC Power Jack for connecting external power adapter.			
D	D Cooling FAN Fan hole with internal fan for ventilation.			
Ε	E Diagnostic Port 8-Pin Mini-DIN Receptacle Diagnostic Port		rt	
F	Port B - SFP Port	1000 Mbps Full Duplex SFP Port B	Only one port can be	
G	Port B - RJ45 Port	10/100/1000 Mbps Half/Full RJ45 Port B	used at the same time.	
Η	Port A - SFP Port	1000 Mbps Full Duplex SFP Port A	Only one port can be	
I	Port A - RJ45 Port	10/100/1000 Mbps Half/Full RJ45 Port A	used at the same time.	
*P	*Please note that when connecting NuDOG-301C with PC via its USB port, DO NOT use a USB hub, and			

DO NOT connect NuDOG-301C with PC before NuDOG-301C is powered on.



3.5. NuDOG-301C LED Status



LED	Status	Description	
Power/Fail	Green Blinking	Power is ON and working properly	
FOwer/Fail	Yellow Blinking	System failed	
USB	Green Blinking	USB of this device is linked to PC	
	Green	NuDOG-301C is working under Stream Generation Mode	
SG/TAP	Yellow	NuDOG-301C is working under TAP Mode	
	OFF	NuDOG-301C is working under NIC (Network Interface Card) mode	
Capture A/B Green Port A/B is under Capturing Mode			
Link/ACT Green ON The RJ45 Port is connected to DUT/Network		The RJ45 Port is connected to DUT/Network	
LIIIK/ACT	Green Blinking	NuDOG-301C is transmitting or receiving data	
	Green ON	1000Mbps connection	
Speed	Green Blinking	100Mbps connection	
	OFF	10Mbps connection if Link/ACT is ON or blinking	



4. NuDOG-801/802 Descriptions

4.1. NuDOG-801/802 OVERVIEW

NuDOG-801/802 is a handheld device with two 10 Gigabit SFP+ Ports for Ethernet testing, and NuDOG-802 also supports 10G /5G/2.5G/1G/100Mbps electrical port with specific NBase-T copper SFP+ transceiver. The main functions of NuDOG-801/802 include multi-streams generation and NIC emulation.

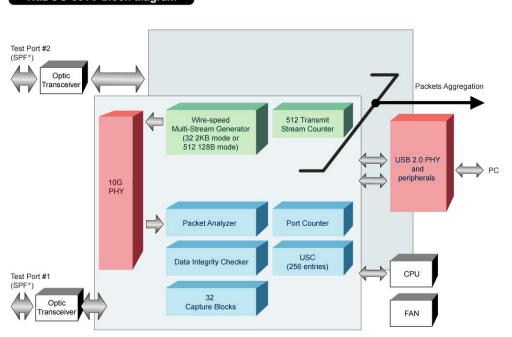
Connecting NuDOG-801/802 to its Standard-B Receptacle USB Port makes it possible for system configurations and managements. NuDOG-801/802 is an ideal device for in-field testing.



NuDOG-801/802 can work along with a series of utility software that qualify industrial standards such as RFC 2544 and RFC 2889. With these utilities, NuDOG-801/802 is able to conduct throughput test, latency test, error filtering test, forwarding test, and so on. Xtramus' utility software provides a user-friendly interface for different test configurations when setting test parameters and criteria. More optional software is available for extended test requirements.

With its unique Universal Stream Counter (USC), NuDOG-801/802 offers real-time statistics of network events during packet monitoring and capturing.

With these advantageous features, NuDOG-801/802 is your best partner for LAB researching and in-field troubleshooting.





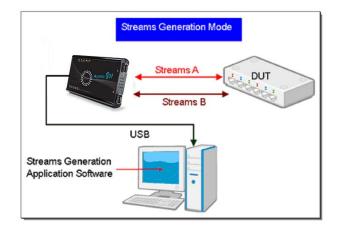


4.2. Features & Advantages of NuDOG-801/802

- > Hardware based wirespeed streams generation, analysis, and NIC
- > High precision performance for measuring throughput, latency, packet loss and disordered sequence
- > Wirespeed traffic capturing with programmable filter and trigger criteria
- > Supports Universal Stream Counter (USC) with 256 streams
- RFC 2544 test suite
- RFC 2889 test suite
- High precision 1 ppm temperature-compensated oscillator provides accurate clock speed to ensure the reliability of the tests
- > Adding errors in transmitted traffic to simulate and test abnormal situations
- Real-time statistics for each port, including transmitted/received frame for VLAN, IPv4, IPv4 fragment, IPv4 extension, ICMP, ARP, total bytes/packets, CRC, IPCS error and over-and-under size frames
- Supports IPv6
- Utility software with user-friendly interface that supports various parameter configurations and meets various test requirements
- > 32 Capture Blocks for each Test Port

4.3. NuDOG-801/802 Applications in Different Modes

Stream Generation Mode



In Streams Generation mode, NuDOG-801/802 generates bi-directional network streams for test requirements as the illustration above.

Both NuDOG-801/802's Port A and Port B can generate and receive test streams. The test streams are sent and returned to the same NuDOG-801/802 for DUT (device under test) analysis.

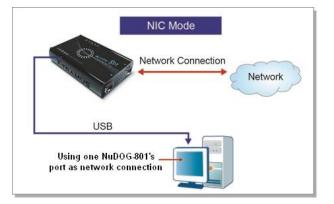


TAP/Loopback Mode Image: State of the state

Loopback Mode

In TAP mode, NuDOG-801/802 can monitor any data that flows through it. Network TAP is a method of monitoring network's situation dynamically without interference. NuDOG-801/802 can tap bi-directional or uni-directional traffic from different sides (port A and port B) and also provides abundant packet counters. In Loopback mode, NuDOG-801/802 resends the incoming streams back to the source.

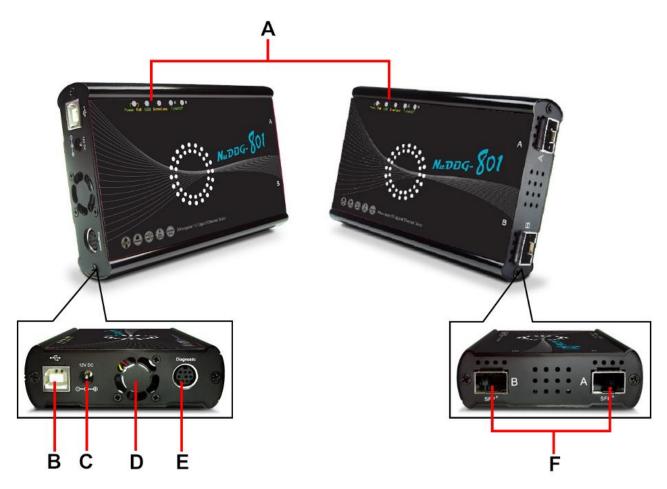
NIC Mode



In this mode, NuDOG-801/802 simulates network interface card (NIC).



4.4. NuDOG-801/802 Interface Ports



Νι	NuDOG-801/802 Hardware Overview		
Α	LEDs	LEDs that displays NuDOG-801/802's status.	
в	Mini-USB Port* 5 Pin Mini-B Receptacle USB Port. You can manage, configure, or update firmware/FPGA when connecting NuDOG-801/802 to your PC. While under TAP mode, this mini-USB port can also re-direct tapped packets to PC.		
С	Power Jack	12V DC Power Jack for connecting external power adapter.	
D	Cooling FAN	Fan hole with internal fan for ventilation.	
Ε	Diagnostic Port	8-Pin Mini-DIN Receptacle Diagnostic Port	
F 10 Gigabit Wirespeed SFP ⁺ Port 10 Gigabit Wirespeed SFP+ Port		10 Gigabit Wirespeed SFP+ Port	

*Please note that when connecting NuDOG-801/802 with PC via its USB port, DO NOT use a USB hub, and DO NOT connect NuDOG-801/802 with PC before NuDOG-801/802 is powered on.



4.5. NuDOG-801/802 LED Status



LED	Status	Description	
Power/Fail Green Blinking		Power is ON and working properly	
FOwer/Fair	Yellow Blinking	System failed	
USB	Green Blinking	USB of this device is linked to PC	
Error/Loss	Yellow Blinking	CRC error or packet loss is occurring	
EII0I/LOSS	OFF	No CRC error or packet loss is occurring	
Capture A/B	Green	Port A/B is under Capturing Mode	
Link/ACT	Green ON	The RJ45 Port is connected to DUT/Network	
LIIIK/ACT	Green Blinking	NuDOG-801/802 is transmitting or receiving data	



5. DApps-SG Stream Generation Utility

DApps-SG provides a powerful and sophisticated virtual front control panel to manage the NuDOG series. Two test ports can be independently configured with parameters to define multiple streams, filters, and capture capabilities. Traffic for various network protocols can be customized, transmitted, and received on each port. Comprehensive statistics provide users an in-depth analysis of the performance of the DUT (Device Under Test).

5.1. Installation of Software Utility

Click to run the .EXE utility execution file provided by Xtramus to install the software. System shows

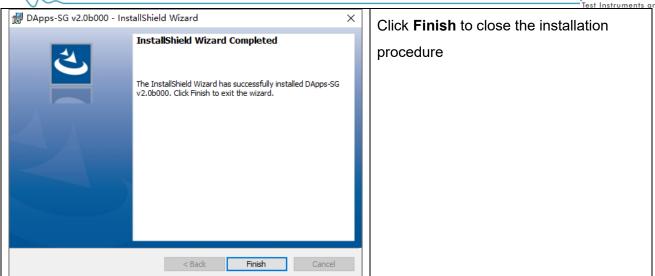
Windows UI	Description
DApps-SG v2.0b000 - InstallShield Wizard	× Welcome to install DApps-SG Utility.
Welcome to the InstallShield Wizard for DApps-SG v2.0b000	Please click Next button to continue
The InstallShield(R) Wizard will install DApps-SG v2.0b000 on your computer. To continue, click Next.	
WARNING: This program is protected by copyright law and international treaties.	
< <u>Back</u> <u>Next</u> Cancel DApps-SG v2.0b000 - InstallShield Wizard × License Agreement Please read the following license agreement carefully.	 × License Agreement for End User. Click I accept the terms in the license
	agreement, and then click Next
End User License Agreement ^	agreement, and then olok next
IMPORTANT NOTICE This is a license agreement between you (either an individual or a single entity) and Xtramus Technologies ("Xtramus"). Before installing or using this software, please read the following license terms carefully. By installing or using this software, you are deemed to accept this license agreement. Do not install or use this software if you do not accept or agree with these license terms.	
I accept the terms in the license agreement Print	
○ I do not accept the terms in the license agreement	
InstallShield	
< Back Next > Cancel	



	Test Instruments of
DApps-SG v2.0b000 - InstallShield Wizard	Click Change to change the install
Destination Folder Click Next to install to this folder, or click Change to install to a different folder.	folder, then click Next
Install DApps-SG v2.0b000 to: C:\Program Files (x86)\Xtramus\ Change	
InstallShield < Back Next > Cancel	
DApps-SG v2.0b000 - InstallShield Wizard	The message prompt you that
Ready to Install the Program The wizard is ready to begin installation.	installation is going to start. Click Install
Click Install to begin the installation.	to continue.
InstallShield	
DApps-SG v2.0b000 - InstallShield Wizard − □ ×	The program is installing.
Installing DApps-5G v2.0b000 The program features you selected are being installed.	
Please wait while the InstallShield Wizard installs DApps-SG v2.0b000. This may take several minutes.	
Status:	
InstallShield	

\$





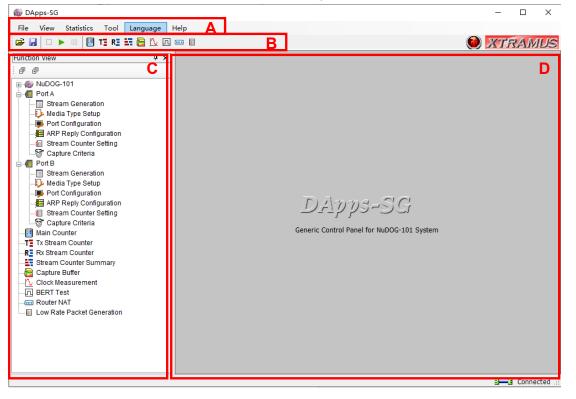
When Installation is done, start the program by clicking Start \rightarrow All Programs \rightarrow Xtramus \rightarrow DApps-SG



vx.xxxxx ("x" is version number) or **DApps-SG** at desktop, then main windows is shown.

5.2. Operation Menu

The operation menu is located at top of this utility







Block in main window: A

pps-SG	-
View Statistics Tool Language Help	6 Med mi
	🔘 XTR
View C View V	C S C or NuDOG-101 System

File View Statistics Tool Lang Load Default Configurations Load Configurations Save Configurations Exit

Menu Choice	Function
Load Defualt Configurations	Reset all settings to default value.
Load Configurations	Load config from a saved file.
Save Configurations	Save the current settings to file.
Exit	Exit and close this utility.

5.2.2. View Sub-menu

File	Viev	v	Statistics	Tool	Lan
🚔 🔓	~	Di	iffServ of IP	/4	
Functio		Fu	unction View		
0		Sy	stem Inforn	nation	

Menu Choice	Function
DiffServ of IPv4	Check Diffserv of IPv4 here, the QoS priority settings in the Frame Data Edit window will be DSCP, shown as the upper picture on the left. Uncheck Diffserv of IPv4 here, the QoS priority settings will be ToS, shown as the lower picture on the left.

\$		ramus truments and Networks
Function View	Display or hide the "Function View".	
System Information	The detailed device information will be displayed.	

5.2.3. Statistics Sub-menu

Statistics	Tool	Language	Help
Main	Counter		
Tx St	ream Co	unter	
Rx St	ream Co	unter	
Strea	m Count	er Summary	

Menu Choice	Function
Main Counter	You can view counter reports, start/stop packet counts on the Main Counter page. For detailed information, please refer to 5.4.3. Main Counter .
Tx Stream Counters Window	Tx Stream Counter allows the user to view the Tx test data of his interest. For detailed information, please refer to 5.4.4. Tx Stream Counter .
Rx Stream Counter	Rx Stream Counter allows the user to view the Rx test data of his interest. For detailed information, please refer to 5.4.5. Rx Stream Counter .
Stream Counter Summary	Stream Counter Summary allows the user to view the test data of his interest. For detailed information, please refer to 5.4.6. Stream Counter Summary .

5.2.4. Tool Sub-menu

File View Statistics	Tool Language Help
😂 🛃 🗆 🕨 🛯 📴	IFG Converter
Function View	Frame Gap for USB Transferring

Menu Choice	Function
IFG Converter	IFG Converter allows the user to converter the frame gap among different units.
Frame Gap for USB Transferring	You can set the gap of packets that will be transmitted back via USB cable per time.





5.2.5. Language Sub-menu

Lar	nguage	Help
~	English	
	简体中区	Ż
	日本語	
	한국어	
	Tiếng \	/iệt

DApps-SG's UI provides 5 languages: **English**, **Simplified Chinese**, **Korean**, **Japanese**, and **Vietnamese**.

5.2.6. Help Sub-menu

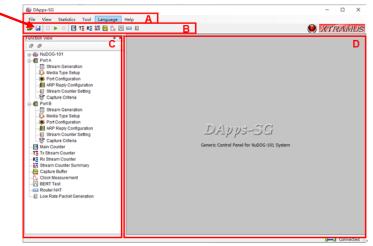
Help
About
System Requirements
Xtramus Web

Menu Choice	Function
About (Model Name)	System information, such as Utility version and Hardware version
	of this device
System Requirement	A " System Requirements " window will pop up and show the requirements for your PC and the FPGA/Firmware of the device.
Xtramus Web	Access Xtramus website (www.xtramus.com).

5.3. Toolbar

The Toolbar is located below operation menu of this utility

Block in main window: B





EFGHIJKLMNOPQR

Keys	Function			
Load Configurations	Select the ".dsc" file you saved before, the system will load the configurations.			
Save Configurations	Save the current configuration as the ".dscc" file.			
Stop All Ports Transmit	Click this button, the 2 ports will stop transmitting.			
Start All Ports Transmit	Click this button, the 2 ports will start transmitting.			
Pause or Resume All Ports Transmit	Click this button, the 2 ports will pause or resume transmitting.			
Main Counter	You can view counter reports, start/stop transmitting on the Main Counter window. For detailed information, please refer to 5.4.3. Main Counter .			
Tx Stream Counter	Tx Stream Counter allows the user to view the Tx test data of his interest. For detailed information, please refer to 5.4.4.Tx Stream Counter .			
Rx Stream Counter	Rx Stream Counter allows the user to view the Rx test data of his interest. For detailed information, please refer to 5.4.5. Rx Stream Counter .			
Stream Counter Summary	Stream Counter Summary allows the user to view the test data of his interest. For detailed information, please refer to 5.4.6. Stream Counter Summary .			
Capture Buffer	User can set capture buffer criteria or start/stop capturing packets here. For detailed information, please refer to 5 .4.7. Capture Buffer .			
Clock Measurement	You can test the Crystal Oscillator's frequency of the DUT and see if it's either faster or slower than standard speed in ppm scale. For detailed information, please refer to 5.4.8. Clock Measurement .			
BERT Test	BERT stands for Bit Error Rate Test. For detailed information, please refer to 5.4.9. BERT Test .			
Router NAT	Test the NAT function of the DUT. For detailed information, please refer to 5.4.10. Router NAT .			
Low Rate Packet Generation	A special packet transmit mode for low rate. For detailed information, please refer to 5.4.11. Low Rate Packet Generation .			





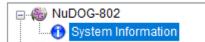
Block in main window: C

nguage Help A	
) XTR
	DDS-SCI ol Panel for Hu00C-101 System

For different selections, there are System Information, Configuration and Status of Port A, Port B, Report and Function Configuration in this block.

5.4.1. System Information

Click the item below to show the system information



On the right side of the main window, it shows

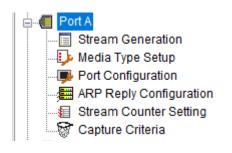
System Information

Model	NuDOG-802
Agent/Customer	Xtramus Agent
s/N	ARCHIGENER.
MAC Address	8×()-1(-8×()-()
PCB Version	MP01
FPGA Version	v1.2b000
Firmware Version	v1.0b000
API Version	v1.0b000
HW License	Normal
HW Upgrade/Usage LIC.Valid for	2022-12 / Unlimited
SW License	Normal
SW Upgrade/Usage LIC.Valid for	2022-12 / Unlimited



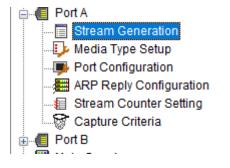


Click the item of ports to show the status or configuration



5.4.2.1. Stream Generation

Click item below to view the Multi Streams Generation configuration window.



System shows the configuration window. User can configure the streams patterns for streams generation.

Port A : Stream Generation									
i 😅 🛃 🛛	🚔 🔄 🔄 📴 🖾 Apply								
A Tx Rate (A B Tx Rate Control Auto Generate Tx Rate \checkmark Stream Transmit Mode Continuous \checkmark								
Total Line	Total Line Rate(Mbps) 10000.00 🛓 Total Utilization(%) 100.0000 🖨 Total Packet Rate(PPS) 14880952 🛓								
	C Stream #	D		Error Burland		G Rate			
Stream # Select Length(w/o CRC) Frame		Frame Payload	Line Rate(Mbps)	Utilization(%)	Packet Rate(PPS)				
	1	\checkmark	60	All 0	10000.00	100.0000	14880952		

lcon	ltem	Function
2	Load	Load a saved config file from PC
_	Save	Save current configuration to a local file
	Set to Default	Set all configuration to default value
	Add Stream	The Add Stream window will popup
	Delet Stream	Delete the selected stream
Ø	Column View Setting	Set the columns shown or hidden in the list by select the item
ĮĮ	Transit SA and SIP to ARP Configuration	Apply the SA and SIP value here to ARP Reply Configuration
📩 Apply	Apply	Apply the current settings





A: Tx Rate Control:

- **B**: Stream Transmit Mode: There are 3 transmit mode.
 - > Continuous: The stream will be transmitted continuously until user click Stop Transmit button.
 - > Packets Limit: User can set a number that packets will be sent
 - > Time Mode: User can set duration that transmission will be last.
- C: Number of Streams: Volume of streams that will be generated
- D: Select Stream : User can tick the checkbox to active the stream generation of this stream
- E: Length (w/o CRC): Frame length in bytes without CRC
- F: Frame Payload: Select the patten of the frame
- G: Rate: Select the unit and input the value of the parameter that the packets will be generated.
 - > Line Rate(Mbps): Mbytes per second in transmission
 - > Packet Rate(PPS): Packet per second. Volume of packets that will be generated per second.
 - > Utilization(%): Percentage of Wirespeed transmission

НТ	k Frame/Gap Contr	ol	X-1	ſAG	J	K	L	M
IFG (bit time)	IBG (bit time)	Frames	Enable	X-ID	Append CRC	Error Generation	Frame Data	Protocol Type
96	96	14880952		0	\checkmark	No Error	Edit	None

H: Tx Frame/Gap Control

> IFG(bit time): Interframe Gap. Ethernet devices must allow a minimum idle period between

transmissions of Ethernet frames. It is called interframe gap (IFG) as the illustration below

Frame IFG Next Frame

The minimum interframe gap is 96 bits time or 12 byte time. It is the time taken for transmission of 96 bits raw data on the media.

> IBG(bit time): Inter Burst Gap. Gap between each burst streams.

> Frames: Total frames that will be sent

I: X-TAG Enable: User can tick the checkbox to active tag generation of X-TAG. When it is ticked, user can select X-ID. Each X-TAG has an unique ID. If there are more than one product of Xtramus is generating the data stream on the same network, their X-ID should be different

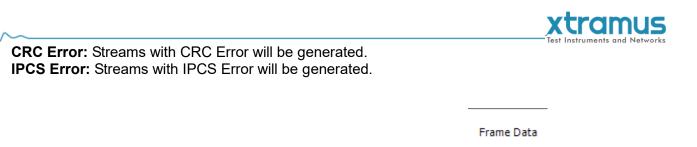
X-TAG that is used as stream tags for providing fundamental information for collecting statistics of multi-stream traffic. Advanced tests like latency, packet loss, and packet sequence miss can be realized by X-TAG.

X-TAG is an Xtramus proprietary 12 bytes embedded tag that is located at 49th~60th bytes of each testing frames that are generated by Rapid-Matrix for multi-stream tests.

J: Append CRC: Add CRC checksum to the end of each frame. CRC checksum is the way to verify the correctness after data transmission. 4 bytes will be added at the end of the frame when CRC checksum is added.

K: Error Generation: User can insert frame errors to the stream.

No Error: No error frames will be generated.



L: Frame Data Edit: Configure the payload contents in frame. Click the **Edit** to edit the detailed contents in frame. For the detail of how to use Frame Editor, please refer to **5.5 Frame Date Edit**

Frame Data

Edit

M: Protocol Type: System shows the Protocol Type when frame content is configured in

DA	SA	Туре	Header	X-TAG		CRC
49th 60th A						
Total Packet Length From 64 ~ 16300 bytes						

<mark>N</mark> М.	AC	0	VLAN L1		P IPv4	
DA	SA	Enable	VID	Enable	DIP	SIP
00-22-A2-00-02-01	00-22-A2-00-02-00		0		192.168.2.1	192.168.2.0

N: MAC: This field displays the **DA (Destination MAC Address)** and **SA (Source MAC Address)** of the stream. Double-click the **DA** and **SA** of each stream, user can edit the destination/source MAC addresses **O**: VLAN L1: This field allows you to enable/disable the VLAN that will be added into the frames. Click and check the "**Enable**" check box to enable the VLAN function, or uncheck the "**Enable**" check box to disable this function. Also, to set the **VID** (VLAN ID), please input the VID manually in the **VID** field.

P: IPv4: This field displays the **DIP (Destination IP Address)** and **SIP (Source IP Address)** of IPv4 protocol. If user would like to add IPv4 header to the frames, click and check the "**Enable**" check box, then edit the value.

	Q IPv6			R TCP			S UDP	
Enable	DIP	SIP	Enable	DPort	SPort	Enable	DPort	SPort
	0000:0000:0000:0000:0000:0000:C0A8:0201	0000:0000:0000:0000:0000:0000:C0A8:0200		9	8		9	8

Q: IPv6: This field displays the **DIP (Destination IP Address)** and **SIP (Source IP Address)** of IPv6 protocol. If user would like to add IPv6 header to the frames, click and check the "**Enable**" check box, then edit the value.

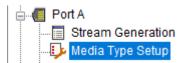
R: TCP: This field displays the DPort (Destination Port) and SPort (Source Port) of TCP protocol. If user would like to add TCP header to the packets, click and check the "Enable" check box, then edit the value.
S: UDP: This field displays the DPort (Destination Port) and SPort (Source Port) of UDP protocol. If user would like to add UDP header to the packets, click and check the "Enable" check box, then edit the value.





5.4.2.2. Media Type Setup

Click item below to configure the link mode. Port A and port B has the same configuration items



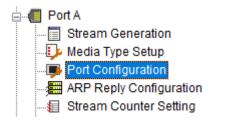
User can view the media link status or force to run specified media link

Port A : Media Type Setup		×
Port A : Media Ty	pe Setup	
Auto Negotiation Mode	Manual Speed Mode	
✓ 100M Full	O Force 100M Full	
🗹 1000M Full	O Force 1000M Full	
☑ 2.5G Full	O Force 2.5G Full	
5G Full	○ Force 5G Full	
🗹 10G Full	Force 10G Full	
Link Up/Down		
O Link Down		
Link Up		
Current Speed		
Auto 10G Full		
Note	use Link Status changes and packet loss.	
changing securgs might ca	se Link Status changes and packet loss.	
	Apply Cancel	
Apply Apply	1	Cancel
Click	to take effect the configuration on this page or clic	ck to

configuration.

5.4.2.3. Port Configuration

Click item below to view the Multi Streams Generation configuration window.



The Port Configuration window contains 7 menu tabs: A. Flow Control, B. Random Packet Length, C. X-TAG Offset, D. Data Integrity (DI), E. Elongated Frame Gap, F. Deficit Idle Count, and G. Packets of USB Burst Transfer. Please see the sections down below for more detailed descriptions.

Tx Flow Control	Rx Flow Control	Rx Rate Control
🔾 Enable 💿 Disable	○ Enable	 Enable Disable
		Rate Limited 10000.00 🖨 Mbp
Control This fun	ation is used to release the net	vork congestion situations. Including

Β.	Random Packet Length			
	Randor	n Pa	cket Length(w/o CRC)	
	Minimu	ım	60	
	Maxim	um	1514	
\mathbf{A}	Random Packet Length (w/o CRC):	Set	the range of the random	n packet length.

C. X-TAG Offset					
	X-TAG Offset				
	Tx Offset	49 Bytes \sim			
X-TAG is a 12-byte tag developed					
enhance measure to check the vali position of the X-TAG in the receive					
with the Byte set in Check Offset ,					
supposed to be validate. The Byte					
Tx Offset: Set the starting pos	ition of the X-TA	G in the transmitte	ed packet from the scroll down		
menu.					



	ole O Enable	e 🖲 Disable				
Data Integrity Illustrat	tion					
			2 nd level CRC			
DA	SA	DATA	FCS			
2nd Level CRC, an advanced data integrity check function, is the checksum computed based on the contents of the frame from the offset through the end of the data field, inclusive. If data is corrupted by DUT and FCS is affected by the error data, 2nd level CRC check will serve as the checksum. Any mismatches of transmitted and received packets are recorded as error of 2nd Level CRC (Data Integrity) check.						

E. Elongated Frame Gap					
	Elongated Frar				
	Enable	O Disable			
When this function is enabled and frame gap will be inserted after a c caused by crystal frequency differe Gap can compensate crystal frequ	ertain amount entials betwee	of packets are transi n DUT and test instru	mitted. This can reduce packet loss ment. Enabling Elongated Frame		

F. I	F. Deficit Idle Count						
		Deficit Idle Count	Disable				
A				ed, it allows tracking and adjusting when the packet length is not an			



G. Packet of USB Burst Transfer

Packets of USB Burst Transfer

20 Packets

 \sim

You can set the amount of packets that will be stored in the capture buffer and transmitted back via USB cable per time.

5.4.2.4. ARP Reply Configuration

Port A : ARP Reply Configuration

Port A : ARP Reply Configuration

			ARP (Address Resolution Protocol)				
	Enable	Source Address	Enable	Source IPv4 Address	Gateway	Netmask	
1		00-22-A2-00-02-00	\checkmark	192.168.2.0	192.168.2.250	24	
2		00-22-A2-00-02-01	\checkmark	192.168.2.1	192.168.2.250	24	
3		00-22-A2-00-02-02	\checkmark	192.168.2.2	192.168.2.250	24	
4		00-22-A2-00-02-03	\checkmark	192.168.2.3	192.168.2.250	24	
5		00-22-A2-00-02-04	\checkmark	192.168.2.4	192.168.2.250	24	
6		00-22-A2-00-02-05	\checkmark	192.168.2.5	192.168.2.250	24	
7		00-22-A2-00-02-06	\checkmark	192.168.2.6	192.168.2.250	24	
8		00-22-A2-00-02-07	\checkmark	192.168.2.7	192.168.2.250	24	
9		00-22-A2-00-02-08	\checkmark	192.168.2.8	192.168.2.250	24	
10		00-22-A2-00-02-09	\checkmark	192.168.2.9	192.168.2.250	24	
11		00-22-A2-00-02-0A	\checkmark	192.168.2.10	192.168.2.250	24	
12		00-22-A2-00-02-0B	\checkmark	192.168.2.11	192.168.2.250	24	
13		00-22-A2-00-02-0C	\checkmark	192.168.2.12	192.168.2.250	24	
14		00-22-A2-00-02-0D	\checkmark	192.168.2.13	192.168.2.250	24	
15		00-22-A2-00-02-0E	\checkmark	192.168.2.14	192.168.2.250	24	
16		00-22-A2-00-02-0F	\checkmark	192.168.2.15	192.168.2.250	24	
17		00-22-A2-00-02-10	\checkmark	192.168.2.16	192.168.2.250	24	
18		00-22-A2-00-02-11	\checkmark	192.168.2.17	192.168.2.250	24	
19		00-22-A2-00-02-12	\checkmark	192.168.2.18	192.168.2.250	24	
				Apply	Cancel		

ARP, namely address resolution protocol, is a TCP/IP protocol to obtain the MAC address based on the IP address.

You can assign multiple MAC address and IP address pairs to one port. As long as the IP address in the ARP request fits one of the assigned pairs, the port will response the ARP request.

To assign a specific MAC address and IP address pair to the port, check the corresponding line in the most left **Enable** column.

Meanwhile, you must enable the ARP according the type of the IP address by check the corresponding line in the ARP **Enable** column.

Each port can simulte 24 MAC/IP pairs.



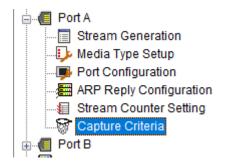


Port A : Stream Counter Setting	2	Х
Port A : Stream Counter Setting	ļ	
Stream Counter Mode		
A Rule	Base on X-TAG $\qquad \lor$	
Block Size	10	
C Begin Stream X-ID	0	
Apply	Cancel	

- A: Rule: The stream counter will be counted base on the selection.
- B: Block Size: The count of stream counter will be counted.
- **C**: This area will display different content according to different rule.

5.4.2.6. Capture Criteria

Click item below to view the Capture Criteria configuration window.



System shows the configuration window. Users can configure the criteria that they want to capture, from protocol or SDFR aspects

Protocol

Different protocols can be combined as unique criteria

t A : Capture C	riteria			
ocol SDFR Result				
Capture All Packets	Α			
MAC	C Network		D Protocol	
Broadcast	Ethern	et-II 🔲 BPDU	🗌 ТСР	
Multicast	ARP	None IPv4	UDP	
Unicast	IPv4	IPv4 with Extension Header	FTP	
VLAN	IPv6	IPv4 Checksum Error	C RTP	
CRC Error			□ OSPF	
Over Size	ICMP		C RSVP	
Under 64 Bytes	IGMP			
Pause	SNAP			
] X-TAG	(77.6)			
Packet Length Filter(with	= \(\) 64	* *		

A: Capture all packets: All packets are captured and sent to PC by USB port. Be attention that packet loss is possible if the captured traffic is higher than traffic allowed for USB port.

B: MAC: MAC based criteria. Packets with MAC events in the list is captured and sent to PC by USB port

C: Network: Network events criteria. Packets with network events in the list is captured and sent to PC by USB port.

D: Protocol: Protocol Type criteria. Packets with protocol type in the list is captured and sent to PC by USB port.

E: X-TAG: X-TAG is an Xtramus proprietary 12 bytes embedded tag. User can capture this kind of packets from product of Xtramus

F: Packet length filter: Capture packet (frame) length in specified range of length

G: Set the count of capture packets

- SDFR:
- SDFR (Self-Discover Filtering Rules) is a technique that make capture of Ethernet easy and convenient
- User-friendly interface that the value such as source IP, destination IP and other criteria for capture and filter can be input directly without calculating mask.
- SDFR value for capture or filter includes several network event (such as DA, SA, DIP...), varied length of frame (oversized, undersized) and varied of frame/packet type (CRC error, IP checksum error...).
- Value of SDFR can be a unique value or a range of values between specified values. All packets that fit the value are captured
- Multiple filter condition can be activated easily by just clicking different options
- Displays captured packet in real-time while network is still running.
- Value of SDFR and filter criteria can be changed dynamically during capture procedure.



Port A : Capture Criteria

	DA	\sim	DA	Single		00 - 00 - 00 - 00 - 00 - 00
	SA		DA	Single	× I	00 - 00 - 00 - 00 - 00 - 00
	VID		SA	Single	\sim	00 - 00 - 00 - 00 - 00 - 00
	DIP		VID	ot a la		0
	SIP		VID	Single	~	0
	DPort		DIP	Single	\sim	0 · 0 · 0 · 0
<u> </u>	SPort					
<u> </u>	DA & SA		SIP	Single	\sim	0 · 0 · 0 · 0
<u> </u>	DA & SA & VID		DPort	Single	\sim	0
	DA & DIP		51 010	Single		- v
	DA & SIP		SPort	Single	\sim	0
	SA & DIP					
	SA & SIP DIP & SIP		Glossa	ry		
	DIP & DPort		SDFR	: Self [Discover	Filtering Rules
	DIP & SPort		DA:	Desti	nation I	MAC Address
	SIP & DPort		SA:	Sour	ce MAC	Address
$\overline{\Box}$	SIP & SPort		VID:	VLAN	I ID	
	DIP & SIP & DPort		DIP:			P Address
	DIP & SIP & SPort		SIP:		ce IP Ad	
	DIP & SIP & DPort & SPort		DPort	: Desti	nation F	Port

A: SDFR items: User can tick the items that act as criteria. When user ticks one option, some other options will be gray. It means the option what user tick has covered the range of those options in gray. B:Pattern

- DA: Destination MAC address
- SA: Source MAC address
- VID: VLAN ID that follows 802.11Q standard
- DIP: Destination IP address
- SIP: Source IP address
- DPort: Destination port of IP address
- SPort: Source port of IP address
- C: Pattern Mode: Select a pattern (Single, Pair, Range) to cover the value of criteria items.
- D: Patterns: The unique value or range of values specified as the capture criteria of criteria items.

For example, user wants to capture packets with VLAN ID 1 to 10.

Proto	col SDFR	Result					
	DA				^		
	SA						
	VID						
	DIP						
Plus							
VID	Range	~ 1	 •	≤ VID	<	10	 ▲ ▼



5.4.3. Main Counter

Click item below to view the Main Counter window.

ARP Reply Configu	🛞 DApps-SG
Capture Criteria	File View Statistics Tool Language
🔛 Main Counter	🚰 🛃 🗆 🕨 📳 🎦 RE 🖽 🔂 🔼 🗔
Tx Stream Counter	Function View
R Rx Stream Counter	ติ ๗

Control button of this window can control packet generation and receiving, and also view the result counter

Main Counter

	А	В	С	D ^	All Linke	d Ports
1	Port	Port A	Port B	Total:2 Ports	Transmit	
2	Module	NuDOG-802	NuDOG-802	-		
3	Link	Link Up	Link Up	-	Capture	
4	Speed	Auto 10G Full	Auto 10G Full	-	Port A	
5	Tx Packets	0	0	0	Transmit	
6	····· Tx Bytes	0	0	0	Capture	
7	······ Tx Packet Rate	0	0	0	Capture	
8	····· Tx L2 Payload Rate(Mbps)	0.00	0.00	0.00	Port B	
9	Tx Datagram Rate(Mbps)	0.00	0.00	0.00	Transmit	
10	······ Tx Line Rate(Mbps)	0.00	0.00	0.00	Capture	
11	····· Tx Utilization(%)	0.00	0.00	0.00	Captard	
12	Rx Packets	0	0	0		
13	Rx Bytes	0	0	0		
14	Rx Packet Rate	0	0	0		
15	Rx L2 Payload Rate(Mbps)	0.00	0.00	0.00		
16	Rx Datagram Rate(Mbps)	0.00	0.00	0.00		
17	Rx Line Rate(Mbps)	0.00	0.00	0.00		
18	Rx Utilization(%)	0.00	0.00	0.00		
19	Collision Packets(Sum)	0	0	0		
24	Error Packets(Sum)	0	0	0		
31	I → ···· Packet Size Statistics(Sum)	0	0	0		
40	Image: Backets (Sum)	0	0	0		
, in	Hum Maturade Lawar Dackate (Sum)	0	0	<u>^</u>		

Connected ...:

Tool Bar

lcon	Item	Function
	Save Main Counter Data	Save current data of counters to Excel file
000	Clear All	Clear all counters to 0
≯() ∢	Hide Zero Counters	If all the counters of this row are 0, this row will be hidden untill the value changed
	Column Width Setting	Set column's width by input the value
	Row View Setting	Set the rows shown or hidden in Main Counter window by select the item
<₽	Send Learning Packets	The linked port will transmit some learning packets
	Float Counters Window	The Main Counter window will popup from DApps-SG window



Counter with \pm mark is expansible. Please click the \pm mark

Error Packets(Sum)
····· Dribble Bits
····· Alignment Error
CRC Error
DI Error
····· IP Checksum Error
BERT Error

Operation

🗄 --- Error

(All Linked	Ports
Transmit	
Capture	
Port A	
Transmit	
Capture	
Port B	
Transmit	
Capture	

This option can activate Transmit or Capture of port A, port B or port A + B individually.

Button	Function
	Stop complete procedure of transmitting or capturing
	Start to transmit or capture procedure
11	Pause transmitting or capturing procedure. System still measure the
	statistics couter, however, the counter value is static for user to
	watch the status when user click the \blacksquare button. When user click
	▶ again, the counter status resume to real status instantly. Click
	this button does not affect the real counters values

5.4.4. Tx Stream Counter

Click item below to view the Tx Stream Counter window.

🖙 🐨 Capture Criteria	🏀 DAp	ps-SG			
Main Counter					Language I
TI Stream Counter	🖻 🛃		· 🔛	TE RE	📰 🗎 🕓 🖸
RI Stream Counter	Function	View		T. C	ream Counter
Stream Counter Summar, Of	് കെ ക			TX St	ream Counter

The dynamic statistics will be displayed here in a table form.



Tx Stream Counter

i 000 🕨 i				
Port A p	ort B			
000	🕨 🗆 🍝 🛛	E		
	A1	• =	Stream #	
	А	В	С	D
1	Stream #	Packets	Bytes	X-ID
2	1	29,760	1,904,640	-
3	2	29,760	1,904,640	-
4	3	29,760	1,904,640	-
5	4	29,760	1,904,640	-
6	5	29,760	1,904,640	-
7	6	29,760	1,904,640	-
8	7	29,760	1,904,640	-
9	8	29,760	1,904,640	-
10	9	29,760	1,904,640	-
11	10	29,760	1,904,640	-
12				

lcon	ltem	Function
	Save Tx Stream Counter Data	Save current data of counters to Excel file
000	Clear (All)	Clear stream counters to 0 for 2 ports or single port
	Start (All Ports)Transmit	Start Tx Stream Counter of 2 ports or single port.
	Stop (All Ports) Transmit	Stop Tx Stream Counter of 2 ports or single port.
≯()∢	Hide Zero Counters	If all the counters of this row are 0, this row will be hidden untill the value changed
Ø	Column View Setting	Set the column shown or hidden in the window by select the item

ī.

5.4.5. Rx Stream Counter

Click item below to view the Rx Stream Counter window.

I Main Counter	🚳 DApps-SG	
Main Counter		Tool Language Helr
R Rx Stream Counter	😅 🛃 🗆 🕨 📳	TE RE ER 😂 🛝 🗔 🚥
Stream Counter Summary	Function View	Rx Stream Counter
🕞 Capture Buffer 🛛 🛛 Or	a a	R

The dynamic statistics will be displayed here in a table form.



Rx Stream Counter

000 🕨 🗆						
Port A Po	ort B					
	🎆 🕨 🗆 🌩 🗷 🗐					
	A1 •	= X-ID #				
	Α	В	с	D	E	F
1	X-ID #	Line Rate(Mbps)	Packets	Bytes		Loss Event
2	X-10 #	Line Race(HDps)	Packets	bytes	Loss Event	First Loss Event Time
3	0	0.00	0	0	0	
4	1	0.00	0	0	0	
5	2	0.00	0	0	0	
6	3	0.00	0	0	0	
7	4	0.00	0	0	0	
8	5	0.00	0	0	0	
9	6	0.00	0	0	0	
10	7	0.00	0	0	0	
11	8	0.00	0	0	0	
12	9	0.00	0	0	0	
13						

Icon	Item	Function
	Save Rx Stream Counter Data	Save current data of counters to Excel file
000	Clear (All)	Clear stream counters to 0 for 2 ports or single port
000 011	Clear All Maximum/Minimum Latency	Clear maximum and minimum latency.
	Start (All Ports)Transmit	Start Tx Stream Counter of 2 ports or single port.
	Stop (All Ports) Transmit	Stop Tx Stream Counter of 2 ports or single port.
≯()∢	Hide Zero Counters	If all the counters of this row are 0, this row will be hidden untill the value changed
₩ E	Column View Setting	Set the column shown or hidden in the window by select the item
#	Stream Counter Setting	The Stream Counter Setting window will pop up if you press this button

5.4.6. Stream Counter Summary

Click item below to view the Stream Counter Summary window.

	🚳 DApps-SG	
	File View Statistics Tool	Language Help
R Rx Stream Counter	😅 🔛 🗆 🕨 🔛 🖽 RE	= <mark>6 🛝 🗔 🚥 🗐</mark>
	Function View	Port A : Streat
Clock Measurement	or 👘 🗇	Stream Counter Summary

User can make stream counter settings here to view the data receiving items of their interest. The dynamic statistics will be displayed here in a table form.

Stream Counter Summary



	Α	В	с	D	E	F
1 2	Port	Condition	Tx Packets	Tx Bytes	Rx Line Rate(Mbps)	Rx Packets
3	Port A	Tx Stream # : 1	0	0	-	
4	Port A	Tx Stream # : 2	0	0	-	
5	Port A	Tx Stream # : 3	0	0	-	
6	Port A	Tx Stream # : 4	0	0	-	
7	Port A	Tx Stream # : 5	0	0	-	
8	Port A	Tx Stream # : 6	0	0	-	
9	Port A	Tx Stream # : 7	0	0	-	
10	Port A	Tx Stream # : 8	0	0	-	
11	Port A	Tx Stream # : 9	0	0	-	
12	Port A	Tx Stream # : 10	0	0	-	
13	Port A	Rx X-ID # :0	-	-	0.00	
14	Port A	Rx X-ID # : 1	-	-	0.00	
15	Port A	Rx X-ID # : 2	-	-	0.00	
16	Port A	Rx X-ID # : 3	-	-	0.00	
17	Port A	Rx X-ID # : 4	-	-	0.00	
18	Port A	Rx X-ID # :5	-	-	0.00	
19	Port A	Rx X-ID # :6	-	-	0.00	
20	Port A	Rx X-ID # : 7	-	-	0.00	
21	Port A	Rx X-ID # : 8	-	-	0.00	
22	Port A	Rx X-ID # :9	-	-	0.00	

Icon	Item	Function
	Save Stream Counter Data	Save current data of counters to Excel file
000	Clear (All)	Clear stream counters to 0 for 2 ports or single port
000	Clear All Maximum/Minimum Latency	Clear maximum and minimum latency.
	Start All Ports Transmit	Start Tx Stream Counter of 2 ports.
	Stop All Ports Transmit	Stop Tx Stream Counter of 2 ports.
ų	Assign Port Map	This button allows user set the ports which they want to view. Only the statistics of the selected ports will be displayed.
	Stream Map Setting	This button allows user set the streams which they want to view. Only the statistics of the selected streams will be displayed.
()	Hide Zero Counters	If all the counters of this row are 0, this row will be hidden untill the value changed
	Row View Setting	A Row View Setting window will pop up if you press this button. Check the items you want to view here, then the checked item will be listed as a row
Ø	Column View Setting	A Column View Setting window will pop up if you press this button. Check the items you want to view here, then the checked item will be listed as a column.
⊒ ∔	Sort Rows	Sort the ports in a ascend trend according to the port ID and Stream ID. This helps the user quickly set the ports in order when the port sequence is messed manually.



5.4.7. Capture Buffer

Click item below to view the Capture Buffer configuration window.

🗄 📲 Port A
🛓 📲 Port B
Tx Stream Counter
R Rx Stream Counter
Stream Counter Summary
Clock Measurement
BERT Test
Low Rate Packet Generation

To view the contents of captured packets, user can select the captured packets from Capture Buffer window

000 🕨										
Port A p	Port B									
000 🚽	► □ 🖗									
Captured	I:4 A									
B 🔺	Delta Time(µs)	Leng	gth(with Ci	RC)	DA		SA		VID	
1	0		64		00-22-A2-00-02	2-00	00-22-A2-00-02-0	01	n/a	
2	6.72		64		00-22-A2-00-02	2-00	00-22-A2-00-02-0	01	n/a	
3	6.72		64		00-22-A2-00-02	2-00	00-22-A2-00-02-0	01	n/a	
	6.72		64		00-22-A2-00-02	2-00	00-22-A2-00-02-0	01	n/a	
	net II. Src: 00:2	2-22-00-02-	01 (00-22	2.22.00.	02:01) Det: 00	0.22.2	2.00.02.00 (00.2)	2-22-00-0	72.00)	
< Ether	estination: 00:22 ource: 00:22:a2:	:a2:00:02:0)0:02:01 (0	0 (00:22:	:a2:00:0)2:00)	0:22:a2	2:00:02:00 (00:2;	2:a2:00:(02:00)	
<	estination: 00:22 ource: 00:22:a2: ype: IP (0x0800)	:a2:00:02:0)0:02:01 (0	0 (00:22: 0:22:a2:0	:a2:00:0)0:02:01)2:00) 1)		2:00:02:00 (00:22		02:00)	
<	estination: 00:22 ource: 00:22:a2: ype: IP (0x0800)	:a2:00:02:0)0:02:01 (0 sion 4, Src:	0 (00:22: 0:22:a2:0	:a2:00:0)0:02:01)2:00) 1)				02:00)	
< <p>Ether Ether Definition of the second se</p>	estination: 00:22 purce: 00:22:a2: ype: IP (0x0800) net Protocol Vers ersion: 4 eader length: 20 00 01 02 0	:a2:00:02:0 00:02:01 (0 sion 4, Src: bytes	0 (00:22: 0:22:a2:0 192.168.	:a2:00:0)0:02:01 2.1 (192)2:00) 1)	: 192.	168.2.0 (192.168	3.2.0)	02:00)	
<	estination: 00:22 purce: 00:22:a2: ype: IP (0x0800) net Protocol Vers ersion: 4 eader length: 20 00 01 02 0 00 22 A2 0	a2:00:02:0 00:02:01 (0 sion 4, Src: bytes 3 04 05 0 0 02 00 0	0 (00:22: 0:22:a2:0 192.168. 6 07 0 (0 22 A2	:a2:00:0 00:02:01 2.1 (192 8 09 04 2 00 02	2:00) 1) 2.168.2.1), Dst A 0B 0C 0D 0 2 01 08 00 4	E 0F 5 00	168.2.0 (192.168	3.2.0)	D2:00)	
< <p>Ether Ether Definition of the second se</p>	estination: 00:22 purce: 00:22:a2: ype: IP (0x0800) net Protocol Vers ersion: 4 eader length: 20 00 01 02 0 00 22 A2 0 00 2E 00 0	a2:00:02:0 00:02:01 (0 sion 4, Src: bytes 3 04 05 0	0 (00:22: 0:22:a2:0 192.168. 6 07 04 0 22 A2 0 FF F4	:a2:00:0 00:02:01 2.1 (192 8 09 04 2 00 02 4 7F C0)2:00) 1) 2.168.2.1), Dst	E 0F 5 00 0 A8	168.2.0 (192.168	3.2.0)	02:00)	

lcon	Item	Function
	Save as Pcap	Save the captured packets to pcap file
000	Clear	Clear current captured packets
۲	Start Capture	Start to capture procedure
	Stop Capture	Stop complete procedure of capturing
đ	Capture Criteria	Set column's width by input the value

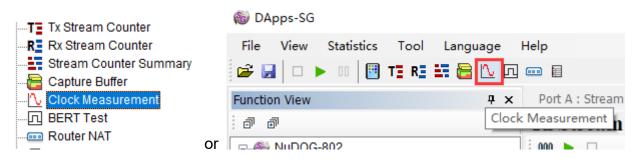


A: The count of captured packets

- B: The list of all captured packets, and summary of network items
- C: Frame view of selected packet
- D: The contents of selected packet

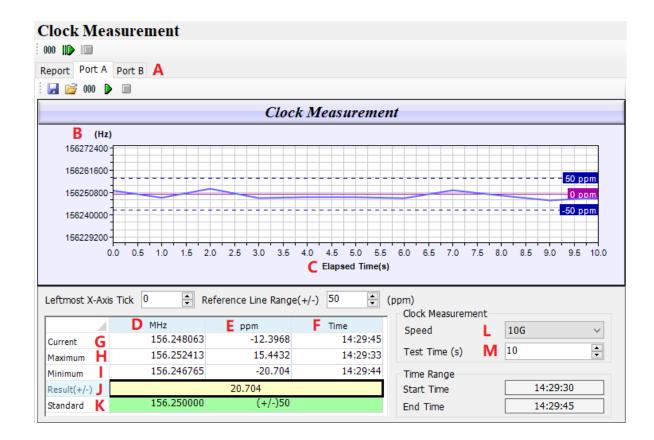
5.4.8. Clock Measurement

Click item below to view the Clock Measurement window.



This device is equipped with high precision 1 ppm temperature-compensated oscillator that can generate precise speed network streams to DUT, or measures the speed rate of DUT's oscillator for speed control of network streams.

By using this application software, operator is able to measure oscillator's speed of DUT that is either faster or slower than standard speed in ppm scale, or use it as criteria to judge the result of test.



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Icon	Item	Function
_	Save	Save the data in the chart to cvs file
1	Load	Load the data from a cvs file
000	Clear Chart Values	Clear current test value
	Start Testing	Start current port to test
	Stop Testing	Stop current port's procedure of testing
	Start Testing All	Start all ports to test
	Stop Testing All	Stop all ports's procedure of testing

- A: Select Port: Select port that connect to DUT for test.
- B: Hz: Hz scale in this curve graph.
- **C**: Elapsed Time(s): Time (second) scale in this curve graph.
- D: MHz: The frequency of Quartz Oscillator.

- **F**: Time: The time of the value detected.
- G: Current: Current detected value.
- H: Maximum: Maximum value of MHz or ppm during the test.
- I: Minimum: Minimum value of MHz or ppm during the test.
- J: Result: The test result in ppm.
- K: Standard: Standard value for reference.
- L: Mode (Speed): Select network speed that user wants to test the DUT.
- M: Test Time(s): Configure the duration of the test.

E: ppm: faster (+) or slower (-) then standard speed. For example, +20 means 20ppm faster then standard speed



5.4.9. BERT Test

BERT Test			×
BERT Test			
🛃 🔄 000 羮 🕨 🔲			
Configuration Report			
Port Map Port A <-> Port B	i12 (multiple of 4)		
Transmit Mode Continuous ~ Tx Time(s)	Tx Packets 1000		
Enable Learning Learning Packets 10 🗍 IFG (bit times and the second sec	ne) 64000 🔔 Delay Time After Learning (s) 1 🚖 Tx Packets Time	out (s) 5	•
Port DA SA	Utilization(%)		
1 Port A 00-22-A2-00-02-01 00-22-A2-00-02-00	100.00		
2 Port B 00-22-A2-00-02-00 00-22-A2-00-02-01	100.00		
Note			
1. The BERT pattern used here is PRBS, and its number of element	ts is 2^31-1.		
2. The Packet Length(in bytes) you input here must be divisible b	y 4 bytes(32 bits).		

BERT stands for **Bit Error Rate Test**, DApps-SG uses 2^31-1 number of elements to generate BERT pattern, DApps-SG will check if BERT patterns are in received packets.

5.4.10. Router NAT

Router NAT is specially used when the DUT is a router. This function provides complete configuration information for testing the routers, which greatly facilitate the configuration work. The settings areas are divided into two types, the white areas and the gray areas. The content in the white area can be configured as the user's expectations while the content of the gray area is automatically obtained after running this function.

Port	Connection Type	Skip DHCP if Valid	DHCP Ti	meout(s)	Source MAC	Source IP	
WAN	DHCP	\checkmark	10	00	Auto Detect	Auto Detect	
LAN	DHCP	n/a	10	00	Auto Detect	Auto Detect	
ent Settin	Ig						
Port	Connect to Router	Source MAC	VLAN	VID	Source IF	UDP SPort	Mapping
rt A	WAN	00-22-A2-00-02-00		0	Auto Dete	ct 8000	n/a
rt B	LAN	00-22-A2-00-02-01		0	Auto Dete	ct 8000	Auto Detect

		xtramus
Icon	Item	Function
	Set to Default	Set all the values to the default
000	Clear	Clear the test result
	Start	Start running the Router NAT function
*	Set to Stream	The settings here will be applied to the packet settings of the stream by clicking this button. User can check the result by view Stream Generation . For detailed information of Stream Generation , please refer to 5.4.2.1. Stream Generation .
0	Keep Alive	With Keep Alive button activated, the system will transmit low flow data by correct configuration to ensure the smoothness of the link. If the correct configuration is not yet obtained, no actions should be taken.

The upper **Router** table shows the configurations of the router, and the lower **NuStreams Port** table shows the configurations of the testing ports.

5.4.11. Low Rate Packet Generation

A special packet transmit mode for low rate. There are 4 entries, every entry can send 1 packet per second at most.

2 000																
rt A p																
2 🔒	ki 🗟	-														
	Stop	A Start		Alia	IS	Le	ength(v/o CR	C) F	D rame Data	Pro	tocol Type	DA F	MAC	G Interval(s)	Packet Cour
1				LRP	3.1		6	0		Edit		None	00-22-A2-00-02-0		1	5
2				LRP		-	6		_	Edit	-	None	00-22-A2-00-02-0		1	5
3				LRP			6	-		Edit	_	None	00-22-A2-00-02-0		1	7
4				LRP			6	-		Edit	-	None	00-22-A2-00-02-0		1	7

- A: Stop/Start: Stop or Start transmission.
- B: Alias: Alias of this entry.
- C: Length (w/o CRC): Frame length in bytes without CRC

D: Frame Data Edit: Configure the payload contents in frame. Click the **Edit** to edit the detailed contents in frame.





E: Protocol Type: System shows the Protocol Type when frame content is configured in Frame Data.
F: MAC: This field displays the DA (Destination MAC Address) and SA (Source MAC Address) of the stream. Double-click the DA and SA of each stream, user can edit the destination/source MAC addresses.
G: Interval(s): The interval the packets will be sent.

H: Packet Count: The count of the packets has been sent.

5.5. Frame Date Edit

To create the pattern and contents of the streams what user want to generate, the utility has Frame Data Edit function to create what user want.

Click Elson Click Click Click Click Click

Port A : Stream Generation										
i 🖆 🛃 🗟 📴 💷 🕼 🚔 Apply										
Tx Rate Control Auto Generate Tx Rate \checkmark Stream Transmit Mode Continuous \checkmark										
Total Lin	Total Line Rate(Mbps) 10000.00 Total Utilization(%) 100.0000 Total Packet Rate(PPS) 14880952									
	ol	X-1	TAG	Append CRC	Error Generation	Frame Data	Droto col Tu			
	Frames	Enable	Enable X-ID		Error Generation	Frame Data	Protocol Ty			
	14880952		0	\checkmark	No Error	Edit	None			

Configure related parameters, then user can click Edit to edit the detailed contents in frame.

5.5.1. Menu

Frame Data Edit

🖻 🛃 🖳 🖻

lcon	Item	Function
*	Load	Load a pcap file from PC to generate the same stream.
	Save	Save the configuration to a pacp file.
	Set to Defualt	Set frame data to default value.
24	Transfer Protocol to User Defined	Base on the protocol which user selected, user can edit the data by themselves.

This window shows all frame type that is configurable. User can also import user-defined file (*.pcap of Ethereal or Wireshark) for test directly.

5.5.2. Protocol Quick Select

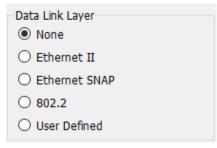
This Frame View window shows the frame structure of the frame that user want to edit.

Data Link Layer None Ethernet II Ethernet SNAP 802.2 User Defined	Layer 3 Protoco None IPv4 IPv6 ARP	PPPoE Discovery PPPoE Session GOOSE	Layer 4 Proto	O PIM IPX in IP	Layer 5 Protocol None DHCP
 Ethernet II Ethernet SNAP 802.2 	 IPv4 IPv6 	O PPPoE Session			
O Ethernet SNAP O 802.2	O IPv6	0	0.0		
0			UDP		
O User Defined		⊖ sv		O ISIS over IP	○ RIP
	O TRILL			O MPLS in IP	
VLAN		○ ptpv2	O ICMPv6		
● None ○ Q-in-Q		⊖ CFM	○ IPv4 in IP		
O VLAN		⊖ FCoE	◯ IPv6 in IP		
Tag	O BPDU		○ RSVP		
None MPLS Unicast	O MAC Control	○ ECP			
O 3Com XNS O MPLS Multicast	○ slow	O LOOP	O OSPFv2		

From **5.5.3** to **5.5.6**, we will briefly introduce some common protocols in different layer.

5.5.3. Data Link layer

Data Link Layer type of streams generation



Data Link layer: The Data Link Layer is Layer 2 of the seven-layer OSI model of computer networking. The Data Link Layer protocols respond to service requests from the Network Layer and they perform their function by issuing service requests to the Physical Layer.

Several protocols options can be chosen for the test.

5.5.3.1. Ethernet II

Ethernet II: The most common Ethernet protocol currently used on LAN



\sim		
Data Link Layer		
○ None		
Ethernet II		
○ Ethernet SNAP		
0 802.2		
O User Defined		
MAC Address		
Destination MAC Address	00 - 22 - A2 - 00 - 02 - 01 Broadcast	
Source MAC Address	00 - 22 - A2 - 00 - 02 - 00	

User can configure the MAC address of DUT.

Destination Address (DA): Default: FF:FF:FF:FF:FF;FF;FF; means broadcast frame. To use variation of DA function, this MAC address is the start MAC address

Source Address (SA): Default: 00:00:00:00:00:00, means the MAC address of this device itself. To use variation of SA function, this MAC address is the start MAC address

5.5.3.2. Variation of DA, SA and VID

The DA and SA is variable if increase or decrease selection is selected

DA, SA of Default Multi Streams generation is fixed

Port A	Port A : Stream Generation								
🖻 🚰	🖆 📙 🗟 📴 🕼 💷 🖉 🚟 🛗 Apply								
Tx Rate	Tx Rate Control Auto Generate Tx Rate \checkmark Stream Transmit Mode Continuous \checkmark								
Total Lin	Total Line Rate(Mbps) 10000.00 🚖 Total Utilization(%) 100.0000 🚖 Total Packet Rate(PPS) 14880952 🚖								
			UDP			HV-DA	HV-SA		
	SPort	Enable	DPort	SPort	Mode	Range	Mode	Range	
	8		9	8	Fixed	00-22-A2-00-02-01	Fixed	00-22-A2-00-02-00	

User can click the selection and change it to increase or decrease and also specify a range of variation as the example below

	HV-DA	HV-SA			
Mode	Range	Mode Range			
Increase	00-22-A2-00-02-00 ~ 00-22-A2-00-02-FF	Increase	00-22-A2-00-02-00 ~ 00-22-A2-00-02-FF		

Assume that the DA is 00-00-21-5C-0A-22

- When increase mode is selected, the last 2 hexdecimal digits will be 22, 23, 24...till the counts of the range.
- When decrease mode is selected, the last 2 hexdecimal digits will be 22, 21, 20...till the counts of the range.



5.5.3.3. IPX

IPX: Internetwork Packet Exchange (IPX) is the OSI-model Network layer protocol in the IPX/SPX protocol stack. The IPX/SPX protocol stack is supported by Novell's NetWare network operating system.

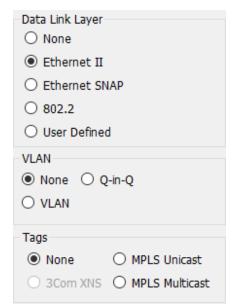
Layer 3 Protocol	
○ None	O PPPoE Discovery
○ IPv4	O PPPoE Session
◯ IPv6	⊖ GOOSE
○ ARP	⊖ sv
\bigcirc ISIS	O PTPv2
	◯ CFM
● IPX	⊖ FCoE
O BPDU	○ FIP
O MAC Control	○ ECP
○ SLOW	

This editor of IPX will added if required.

5.5.4. Tags

When Ethernet II of Data Link Layer is selected, extra tag options is available.

When Ethernet II is selected, Tags option is enabled.

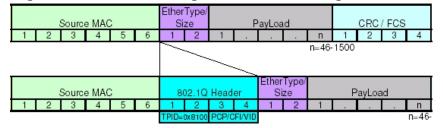




0	5.5.4.1.	VLAN
VLAN		
O None	◯ Q-in-Q	
● VLAN		

A virtual LAN, commonly known as a VLAN, is a group of hosts with a common set of requirements that communicate as if they were attached to the Broadcast domain, regardless of their physical location. The protocol most commonly used today in configuring virtual LANs is IEEE 802.1Q.

IEEE 802.1Q adds a 32-bit field between the source MAC address and the EtherType/Length fields of the original frame. The VLAN tag field has the following format:



VLAN Tag in Ethernet Frame

To configure the VLAN for streams generation, click the VLAN Tab

Protocol Quick Select	Ethernet II	VLAN	Frame View			
VLAN L1 Parameters						
User Priority	CFI		VID			
0 ~	0 - Reset	~	0	•	VLAN L2	
VLAN L2 Parameter	'S					
User Priority	CFI		VID			
0 ~	0 - Reset	\sim	0	×	VLAN L3	
VLAN L3 Parameter	S					
User Priority	CFI		VID			
0 ~	0 - Reset	\sim	0	*		

User priority (also called COS, class of service) and VID are most common parameter for the test

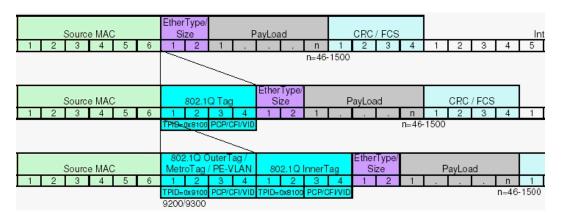
5.5.4.2. Q-in-Q







IEEE 802.1ad (Provider Bridges) is an amendment to IEEE standard IEEE 802.1Q-1998 and it is called Q-in-Q or Stacked VLANs



To configure the Q-in-Q for streams generation, click the Q-in-Q Tab

Protocol Quick Select	Ethernet II Q-In-Q	Frame View		
S-Tag				
-	Lines Drinites	CET	LUD.	
Ether Type (Hex)	User Priority	CFI	VID	
88:A8	0	✓ 0 - Reset	~ 0	-
C-Tag				
Ether Type (Hex)	User Priority	CFI	VID	
			VID VID	-
Ether Type (Hex)	User Priority 0			•
81:00				
81:00 Note	0	∨ 0 - Reset	~ 0	
81:00 Note The "Ether Type"		 O - Reset ined include 0x88A8 	~ 0	



Tags	
O None	MPLS Unicast
O 3Com XNS	O MPLS Multicast

In computer networking and telecommunications, Multiprotocol Label Switching (MPLS) refers to a mechanism that directs and transfers data between Wide Area Networks (WANs) nodes with high performance, regardless of the content of the data. MPLS makes it easy to create "virtual links" between nodes on the network, regardless of the protocol of their encapsulated data.

MPLS works by prefixing packets with an MPLS header, containing one or more 'labels'. This is called a label stack. Each label stack entry contains four fields:

> A 20-bit label value.

A 3-bit Traffic Class field for QoS (Quality of Service) priority (experimental) and ECN (Explicit www.xtramus.com

 54
 sales@xtramus.com , techsupport@xtramus.com



Congestion Notification).

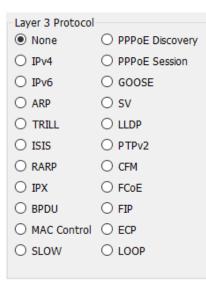
- > A 1-bit bottom of stack flag. If this is set, it signifies that the current label is the last in the stack.
- > An 8-bit TTL (time to live) field.

This can be defined by the configuration of this utility.

Protocol Quick Sel	ect Ethernet II	MPLS Unicast	Frame View			
Label	# MPLS I	abel Expe	eriential Use	Time to Live	 	+
Label # 1			0	0		
						-
Payload Type	None		~			

5.5.5. Layer 3 Header

In the payload of frame, layer 3 header as the items below is configurable





5.5.5.1. IPv4

Layer 3 Protocol	
○ None	O PPPoE Discovery
IPv4	O PPPoE Session
◯ IPv6	⊖ goose
○ ARP	⊖ sv

IPv4: Internet Protocol version 4 (IPv4) is the fourth revision in the development of the Internet Protocol (IP) and it is the first version of the protocol to be widely deployed.

The structure of IP header is illustrated below

bit offset	0–3	4–7	8–15	16–18	19–31		
0	Version	Header Iength	Differentiated Services	Total Length			
32	Identification			Flags	Fragment Offset		
64	Time to Live Protocol			Header Checksum			
96			Source	Address			
128			Destinati	on Addre:	35		
160	Options						
160							
or 192+	Data						

The utility has user configurable interface to match the structure of IPv4 header

Protocol Quick Select Ethernet II IPv4 Frame View							
IPv4 Address							
Destination IP Address	192 · 168 · 2 · 1						
Source IP Address	192·168·2·0						
A (TOS Bit 0-2) Precedence	000 - Routine 🗸 🗸	Identification	0				
(TOS Bit 3) Delay	0 - Normal V	Fragment	May Fragment \sim				
(TOS Bit 4) Throughput	0 - Normal V		Last Fragment \sim				
(TOS Bit 5) Reliability	0 - Normal V	Fragment Offset(x8)	0				
(TOS Bit 6) Cost	0 - Normal V	Time to Live	64				
	E	Protocol	0xFF - Reserved \sim				

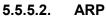
A: Differentiated Services (DS) was originally defined as the TOS (**Type of Services**) field; this field is now defined by RFC 2474 for Differentiated services (DiffServ) and by RFC 3168 for Explicit Congestion Notification (ECN), matching IPv6.





B: Most common protocols numbers are listed below and the utility has detail configuration of these protocol.

Protocol		0xFF - Reserved	~
		0x01 - ICMP	
		0x02 - IGMP	
		0x04 - IPv4 in IP	
ith		0x06 - TCP	
		0x11 - UDP	
		0x29 - IPv6 in IP	
		0x2E - RSVP	
		0x2F - GRE	
		0x3A - ICMPv6	
		0x59 - OSPFv2	
		0x67 - PIM	
		0x6F - IPX in IP	
		0x70 - VRRP	
		0x7C - ISIS over IP	
		0x89 - MPLS in IP	
у	Cancel	0xFF - Reserved	



-Layer 3 Protocol	
O None	O PPPoE Discovery
◯ IPv4	O PPPoE Session
O IPv6	
ARP	⊖ sv
	O PTPv2
	○ CFM

ARP: Address Resolution Protocol (ARP) is the method for finding a host's link layer (hardware) address when only its Internet Layer (IP) or some other Network Layer address is known. ARP is primarily used to translate IP addresses to Ethernet MAC addresses.

The structure of ARP header is illustrated below

bit offset	0 - 7	8 - 15	16 - 31		
0	Hardware ty	rpe (HTYPE)	Protocol type (PTYPE)		
32	Hardware length (HLEN) Protocol length (PLEN)		Operation (OPER)		
64		Sender hardware add	ress (SHA) (first 32 bits)		
96	Sender hardware addre	ess (SHA) (last 16 bits)	Sender protocol address (SPA) (first 16 bits)		
128	Sender protocol addre	ss (SPA) (last 16 bits)	Target hardware address (THA) (first 16 bits)		
160	Target hardware address (THA) (last 32 bits)				
192	Target protocol address (TPA)				

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The utility has user configurable interface to match the structure of ARP header. sales@xtramus.com , techsupport@xtramus.com

~~			Test
rotocol Quick Select Etherne	et II ARP Frame View		
Hardware Type	1 - Ethernet 🗸 🗸	Sender Hardware Address	00 - 00 - 00 - 00 - 00
Protocol Type (Hex)	08 : 00	Sender Protocol Address	0 · 0 · 0 · 0
Hardware Address Length	6	Target Hardware Address	00 - 00 - 00 - 00 - 00
Protocol Address Length	4	Target Protocol Address	0 · 0 · 0 · 0
Operation	1 - ARP Request \sim		

5.5.5.3. Pause

Layer 3 Protocol	
○ None	O PPPoE Discovery
○ IPv4	O PPPoE Session
⊖ IPv6	⊖ goose
○ ARP	⊖ sv
\bigcirc isis	O PTPv2
	○ CFM
⊖ ipx	⊖ FC₀E
O BPDU	⊖ FIP
MAC Control	○ ECP
○ SLOW	

Pause: PAUSE is a flow control mechanism on full duplex Ethernet link segments defined by IEEE 802.3x and uses MAC Control frames to carry the PAUSE commands.

P	rotocol Quick Select	Ethernet II	MAC Control	Frame Vie
	Pause Quanta			
	Opcode	00:01		
	Pause	32767		▲ ▼

The Destination Address of Pasue frame is 01:80:C2:00:00:01. This particular address has been reserved for PAUSE frames.

The MAC Control opcode for PAUSE is 00:01 (0X0001 in hexadecimal)

A PAUSE frame includes the period of pause time being requested, in the form of two byte unsigned integer (0 through 65535). This number is the requested duration of the pause.





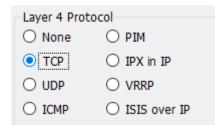
In the payload of frame, if IPv4 is selected

-Layer 3 Protocol	
○ None	O PPPoE Discovery
IPv4	O PPPoE Session
O IPv6	⊖ goose
○ ARP	⊖ sv

Then Layer 4 header as below is configurable

Layer 4 Proto	Layer 4 Protocol				
None					
○ тср	\bigcirc IPX in IP				
	\bigcirc ISIS over IP				
	O MPLS in IP				
○ ICMPv6					
\bigcirc IPv4 in IP					
\bigcirc IPv6 in IP					
○ RSVP					
O OSPFv2					





The Transmission Control Protocol (TCP) is one of the core protocols of the Internet Protocol Suite. The structure of TCP segment is illustrated below. The TCP header starts after bit 160 of the IP header.





	TCP Header										
Bit offset	0–3	47		8–15 16–31			16–31				
0				Sou	irce po	ort					Destination port
32		Sequence number									
64		Acknowledgment number									
96	Data offset	Reserved	CWR	ECE	URG	АСК	PSH	RST	SYN	FIN	Window Size
128		Checksum Urgent pointer									
160		Options (optional)									
160/192+	Data										

Flags (8 bits) (called Control bits) – contains 8 1-bit flags

- CWR (1 bit) Congestion Window Reduced (CWR) flag is set by the sending host to indicate that it
 received a TCP segment with the ECE flag set (added to header by <u>RFC 3168</u>).
- ECE (ECN-Echo) (1 bit) indicate that the TCP peer is <u>ECN</u> capable during 3-way handshake (added to header by <u>RFC 3168</u>).
- URG (1 bit) indicates that the URGent pointer field is significant
- ACK (1 bit) indicates that the ACKnowledgment field is significant
- PSH (1 bit) Push function
- RST (1 bit) Reset the connection
- SYN (1 bit) Synchronize sequence numbers
- FIN (1 bit) No more data from sender

The utility has user configurable interface to match the structure of TCP segment

Protocol Quick Select Ethernet II IPv4 TCP Frame View			
TCP Parameters			
Source Port	8	Flags	
Destination Port	9	Acknowledge Valid	
Sequence Number	0	Push Function	
Acknowledgement Number	0	Reset Connection	
Header Length (x4)	5	Synchronize Sequence	
Window	2161	No More Data From Sender	
Urgent Pointer	1		
Checksum	Correct ~		





5.5.6.2. UDP/IP

Layer 4 Protocol				
O None	○ PIM			
○ тср	\bigcirc IPX in IP			
UDP				
	\bigcirc ISIS over IP			
	O MPLS in IP			
O ICMPv6				
~				

UDP/IP

The User Datagram Protocol (UDP) is one of the core members of the Internet Protocol Suite, the set of network protocols used for the Internet.

The structure of UDP segment is illustrated below. The UDP segment starts after bit 160 of the IP header

bits	0 - 15	16 - 31	
0	Source Port	Destination Port	
32	Length	Checksum	
64	Data		

The utility has user configurable interface to match the structure of UDP segment

Protocol Quick Select	Ethernet II	IPv4	UDP	Frame V
UDP Parameters				
Source Port	8		•	
Destination Port	9		•	
Checksum	Null		~	
Payload Type	None		~	



\sim		
	5.5.6.3.	ICMP/IP

-Layer 4 Protoc	col
O None	
○ тср	◯ IPX in IP
ICMP	\bigcirc ISIS over IP
	O MPLS in IP
O ICMPv6	
O TPv4 in TP	

ICMP/IP

The Internet Control Message Protocol (ICMP) is one of the core protocols of the Internet Protocol Suite.

The structure of ICMP segment is illustrated below

The ICMP header starts after bit 160 of the IP header

Bits	160-167	168-175	176-183	184-191
160	Туре	Code	Chec	ksum
192	ID		Sequ	ence

The utility has user configurable interface to match the structure of ICMP segment

P	rotocol Quick Select	Ethernet II	IPv4	ICMP Fr
	ICMP Parameters			
	Туре	0x00 - Echo I	Reply	\sim
	Code	0		-
	ID	0		▲ ▼
	Sequence	0		•



Layer 4 Protocol			
○ None	○ PIM		
○ тср	○ IPX in IP		
○ UDP			
○ ICMP	\bigcirc ISIS over IP		
IGMP	○ MPLS in IP		
○ ICMPv6			
\bigcirc IPv4 in IP			

IGMP/IP

The Internet Group Management Protocol (IGMP) is a communications protocol used to manage the membership of Internet Protocol multicast groups.

The structure of IGMP segment is illustrated below. The IGMP header starts after bit 160 of the IP header



+	Bits 0 - 7	8 - 15	16 - 23	24 - 31			
0	Туре	Max Resp Time	Chec	ksum			
32		Group Ad	dress				

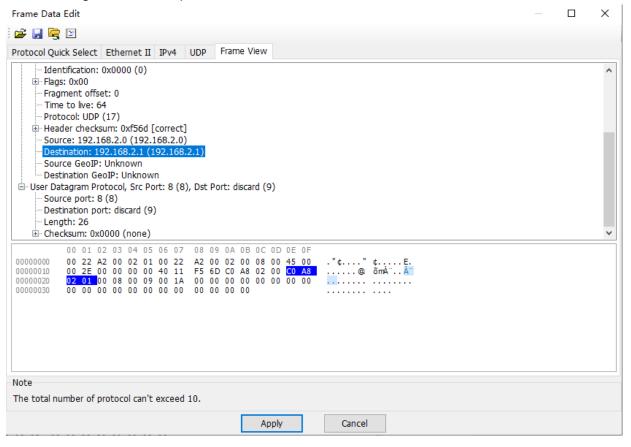
The utility has user configurable interface to match the structure of IGMP segment

There are three versions of IGMP

Protocol Quick Select	Ethernet II	IPv4	IGMP	Frame View	
IGMP Parameters					
Version		2			~
Туре		0x11	- Group	Membership (Query ~
Group Address		0 ·	0 · 0	• 0	
Max Response Tim	ne(x0.1s)	8		•	

5.5.7. Frame View

The figure shows the structure of packet/frame that will be generated. The figure is changeable, depending on the configuration of the packet/frame.





6. Operation of NuDOG series with DApps-SG

This chapter tells you how to use this device to test the DUT

6.1. Control from USB Port

NuDOG series comes with a GUI utility software for controlling of this machine. Operator can operate this machine via USB port by Windows user interface, and also collect statistic counter and do system upgrade.

	Basic System Requirement for DApps-SG
	Windows 7/8/10
CPU	1.6 GHz, 32 bits (x86) CPU
RAM	4GB RAM
HDD	10G available space
	(available space means the space for installation and operation)

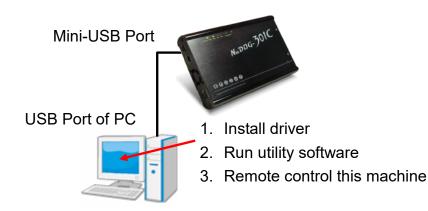
USB cable with mini-USB connector comes with the package of this machine. If operator does not have this cable, it is possible to purchase it from local electronic store. It is an industrial standard cable with standard male USB connector and standard male mini-USB connector at each side.

6.1.1. Installation of Driver

To active the USB connection, install driver for NuDOG series is required

The procedure below shows the installation of driver

- 1. Power On the machine (the NuDOG-101T doesn't need this step)
- 2. Connect USB cable to both PC and mini-USB port of NuDOG series



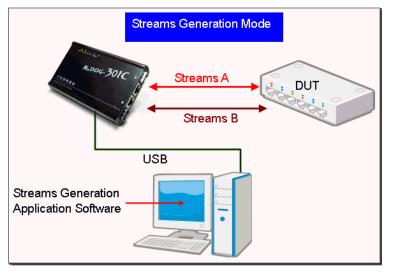
3. Windows will prompt you that new USB device is found and it needs driver. Manual select the driver location at the folder ...\driver which operator gets it from Xtramus. Follow the instruction of Windows to finish the installation.

6.2. Hardware connection

To use this device, user can connect it to DUT as the illustration below, and DO NOT connect



NuDOG-301C or NuDOG-801/802 with PC before the device is powered on.



Then NuDOG series can generate test stream to DUT and also receive data stream from DUT for analysis

6.3. Operation of DApps-SG

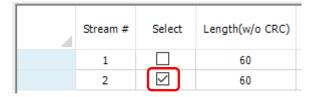
6.3.1. Generate Test Streams to DUT

To generate the test streams, user should configure the pattern and contents of the test streams

Click 🔲	Click 🔲 Stream Generation , System shows								
Port A : Stre	Port A : Stream Generation ×								
Port A : Stream Generation									
🖻 🛃 🗟	🔁 💷 1	🖉 🚟 🖥	🖞 Apply						
Tx Rate Con	ntrol Aut	o Genera	te Tx Rate 🛛 🗸	Stream Transm	it Mode Continuous 🗸				
Total Line R	ate(Mbps)	10000.	.00 🌲 Total	Utilization(%)	00.0000 💂 Total Pac	ket Rate(PPS) 1488	80952 🚔		
	tream #	Select	Length(w/o CRC)	Frame Payload		Rate		Тх	Frame
	u calii #	Select	Length(w/o CKC)	FrancePayloau	Line Rate(Mbps)	Utilization(%)	Packet Rate(PPS)	IFG (bit time)	IBG
	1	\checkmark	60	All 0	10000.00	100.0000	14880952	96	

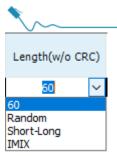
Select the streams volume user want to generate.

User can create many streams; however, only tick streams that user want to send



Double click value in the grid of length, then user can change the value. Select Random, Short-Long, IMIX or input the length directly.





Select the unit and input the value of the parameter that the packets will be generated.

Rate						
Line Rate(Mbps)	Utilization(%)	Packet Rate(PPS)				
10000.00	100.0000	14880952				
10000.00	100.0000	14880952				

Line Rate: Mbytes per second in transmission

Utilization: Percentage of Wirespeed transmission

PPS: Packet per Second. Volume of packets that will be generated per second.

Tick to activate X-TAG if user needs

X-TAG						
Enable	X-ID					
\checkmark	0					
\checkmark	0					

Click Frame Editor to edit the pattern and contents of stream packets. Please refer to 5.5 Frame Date **Edit** about how to use frame editor

When all procedures are done, the read-only basic information at last few items if shown automatically

Tx Frame/Gap Control						
IFG (bit time)	IBG (bit time)	Frames				
96	96	14880952				
96	96	14880952				

Then click Apply to take effect.

6.3.1.1. Start to generate test streams

When all configurations is done, click Main Counter Panel on Toolbar

😅 🛃 🗆 🕨 🔲 📳 T3 R3 💵 🔚 📐 🗔 🚥 🗟

	000 츷 🖽 🗷 😼 😽 💻					
	A1 • = Po	rt				
	Α	В	С	D	^ 🔝 Linke	ed Ports
1	Port	Port A	Port B	Total:2 Ports	Transmit	
2	Module	NuDOG-802	NuDOG-802	-	Capture	
3	Link	Link Up	Link Up	-	Capture	
4	Speed	Auto 10G Full	Auto 10G Full	-	Port A	
5	····· Tx Packets	0	0	0	Transmit	
6	····· Tx Bytes	0	0	0	Capture	
7	····· Tx Packet Rate	0	0	0	Capture	
8	Tx L2Payload Rate(Mbps)	0.00	0.00	0.00	Port B	
9	Tx Datagram Rate(Mbps)	0.00	0.00	0.00	Transmit	
10	····· Tx Line Rate(Mbps)	0.00	0.00	0.00	Capture	
11	····· Tx Utilization(%)	0.00	0.00	0.00	Capitalite	
12	····· Rx Packets	0	0	0		
13	····· Rx Bytes	0	0	0		
14	····· Rx Packet Rate	0	0	0		
15	Rx L2 Payload Rate(Mbps)	0.00	0.00	0.00		
16	····· Rx Datagram Rate(Mbps)	0.00	0.00	0.00		
17	····· Rx Line Rate(Mbps)	0.00	0.00	0.00		
18	Rx Utilization(%)	0.00	0.00	0.00		
19	🗄 🗠 Collision Packets(Sum)	0	0	0		
24	Error Packets(Sum)	0	0	0		
31	Packet Size Statistics(Sum)	0	0	0		
40		0	0	0		
< notes that the second	El-Matuark Lawar Dackate (Sum)	0	0	0	¥	

Click control button on operation button to control the packet generation Expend sub-item counter to see more details of counters.

6.3.2. Capture Specified Packets

To capture packets/frames of incoming streams to PC via USB port, configure capture criteria is required.

Click Capture Criteria button. The system shows the capture criteria settings

vtramus

t A : Capture Criteria			- [- X
ort A : Capture Cr	iteria			
tocol SDFR Result				
Capture All Packets				
MAC	Network	Protocol		
Broadcast	Ethernet-II BPDU	🗌 ТСР		
Multicast	ARP None IPv4	UDP		
Unicast	□ IPv4 □ IPv4 with Extension Header	FTP		
VLAN	IPv6 IPv4 Checksum Error	RTP		
CRC Error	□ IPX	OSPF		
Over Size	ICMP	RSVP		
Under 64 Bytes	IGMP			
Pause	SNAP SNAP			
X-TAG Packet Length Filter(with	CRC)			
	= \(64)			
Capture Packet Number	1			

User can configure criteria of Protocol, SDFR according to section 5.4.2.6 Capture Criteria

Then Click 🔚 Capture Buffer , Start capture from the Capture Buffer window

Dentured	: 4					
	Delta Time(µs)	Length(with CRC)	DA	SA	VID	
1	0	64	00-22-A2-00-02-00	00-22-A2-00-02-01	n/a	
2	6.72	64	00-22-A2-00-02-00	00-22-A2-00-02-01	n/a	
3	6.72	64	00-22-A2-00-02-00	00-22-A2-00-02-01	n/a	
4	6.72	64	00-22-A2-00-02-00	00-22-A2-00-02-01	n/a	
🗄 🗹 De	stination: 00:22:a2	2:00:02:01 (00:22:a2:0) 2:00:02:00 (00:22:a2:00	:02:00)	2:00:02:00 (00:22:a2:0	0:02:00)	
i ⊡ De ⊡ So	stination: 00:22:a2	2:00:02:00 (00:22:a2:00 02:01 (00:22:a2:00:02:0	:02:00)	2:00:02:00 (00:22:a2:0	0:02:00)	
i⊞ ·· De i∰ ·· So	stination: 00:22:a2 urce: 00:22:a2:00:	2:00:02:00 (00:22:a2:00 02:01 (00:22:a2:00:02:0 (ff)	:02:00)	2:00:02:00 (00:22:a2:0	0:02:00)	
i ⊡ De ⊡ So	stination: 00:22:a2 urce: 00:22:a2:00: pe: Unknown (0xff	2:00:02:00 (00:22:a2:00 02:01 (00:22:a2:00:02: fff) 04 05 06 07 08 09 02 00 00 22 A2 00):02:00) 01)	2:00:02:00 (00:22:a2:0		

The result of captured frame is shown on Capture Buffer window.



6.3.3. View counter of captured packet and others

User can view the counters of captured packet by SDFR criteria

Click Main Counter Panel on Toolbar



Expand SDFR sub-counter item by clicking "+" of SDFR (Self Discover Filtering Rules)(Sum), user the see the packet counts that is captured by SDFR criteria

User also can see conters of other events.

SDFR (Self Discover Filtering Rules)(Sum)	0	3,073,103	3,073,103
DA Rule Hit	0	3,073,103	3,073,103
SA Rule Hit	0	0	0
····· VID Rule Hit	0	0	0
SIP Address Rule Hit	0	0	0
DIP Address Rule Hit	0	0	0
DPort Rule Hit	0	0	0
SPort Rule Hit	0	0	0